POLLEN DIMORPHISM IN HETEROSTYLED OLDENLANDIA UMBELLATA

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In a previous paper the author (Bir Bahadur, 1963) dealt with dimorphic heterostylism in *Oldenlandia umbellata* L., a member of the Rubiaceae of the tribe Oldenlandeae and also reviewed the heterostyled Rubiaceae so far known. In the present paper the exine dimorphism of *O. umbellata* L., is described.

In heterostyled plants pollen dimorphism is invariably associated with style and stigma dimorphism. Usually small pollen grains are found in the low anthers of long styled forms, called Pins, and large pollen grains in the high anthers of small styled forms, called Thrums. Almost all heterostyled species, with exception of *Linum grandiflorum*, (Lewis, 1941), exhibit this phenomenon. (Baker, 1954, 1956, 1958, 1961; Bir Bahadur, 1963).

Among the features which distinguish the heterostylic incompatibility system, the exine dimorphism of pollen grains is one (Lewis, 1956, Baker, 1954). The earlier literature has been reviewed several times by Baker. He found that the tribe Staticeae of the Plumbaginaceae contains self-incompatible heterostyled species, where two kinds of pollen, type A and type B, are associated with the Cob and Papillate stigmas respectively. Type A has a complex ornamentation with polygonal lumina, while type B has less fine ornamentation. A similar phenomenon also occurs in the Rubiaceous species *Rudgea jasminoides*, (Baker, 1956), where in short styled flowers the pollen grain has a spiny exine and in long styled flowers the pollen grain has a smooth exine. A similar case is also reported in a heterostyled species of *Linum* by Laibach (quoted by Saad, 1961).

More recently Wendelbo (1961 a and b) in his extensive studies of the Primulaceae has noted pollen dimorphism for *Hottonia palustris* and *Dionysia* species.

In the genus *Oldenlandia* pollen dimorphism has been known since the days of Darwin, (1892). Recently, Breme-

kamp (1952), Baker (1958) and the present author have shown correlated pollen dimorphism in the heterostyled species, but except for *O. angustifolia* none of the species of this genus has been studied palynologically (Erdtman, 1952). Very recently Verdcourt (1958) and Hallé (1961) studied pollen grains of the Rubiaceae and Mussaendeae respectively in detail, but, however, have not reported exine dimorphism in any heterostyled species.

For the study of exine morphology of pollen grains of Pin and Thrum forms of *O. umbellata,* polliniferous material was acetolysed separately according to the procedure described by Erdtman (op. cit.). Separate slides of Pin and Thrum pollen grains were examined by taking photomicrographs at different foci in a sequence. Thirty to forty pollen grains were measured for polar and equatorial diameters.

Pollen grains from Thrum flowers: —

Pollen grains larger tricolporate, longicolpate, subprolate, (24.35 × 20.5μ). Ora slightly lalongate, colpae 18.8μ long, gradually tapering on either side of the pollen grain, membrane smooth. Sexine as thick as nexine, reticulate, homobrochate, lumina usually hexagonal, psilate (1-2μ), muri simplibaculate, meshes gradually increasing in size from centre towards periphery. (Figs. 1-3)

Pollen grains from Pin flowers: —

Pollen grains small, tricolporate, longicolpate, subprolate, (21.5 × 18.3μ). Ora slightly lalongate, often circular, colpae 14.66μ long, gradually tapering on either pole, membrane smooth, exine crassisexinous, reticulate, homobrochate, lumina hexa to polygonal, finer than that of thrum, psilate, muri simplibaculate, meshes gradually increasing in size from centre towards periphery. (Figs. 4-6)

From the above description it is evident that pollen dimorphism similar to *Rudgea jasminoides* is also found in *Oldenlandia umbellata* L.; however, the differences as in *Rudgea* are not very marked.

Thus pollen dimorphism associated with exine dimorphism which in turn is associated with heterostyly and heterostameny occurs in *O. umbellata* L. (c.f. Bir Bahadur, l.c.)

As this phenomenon has been considered to be of impor-

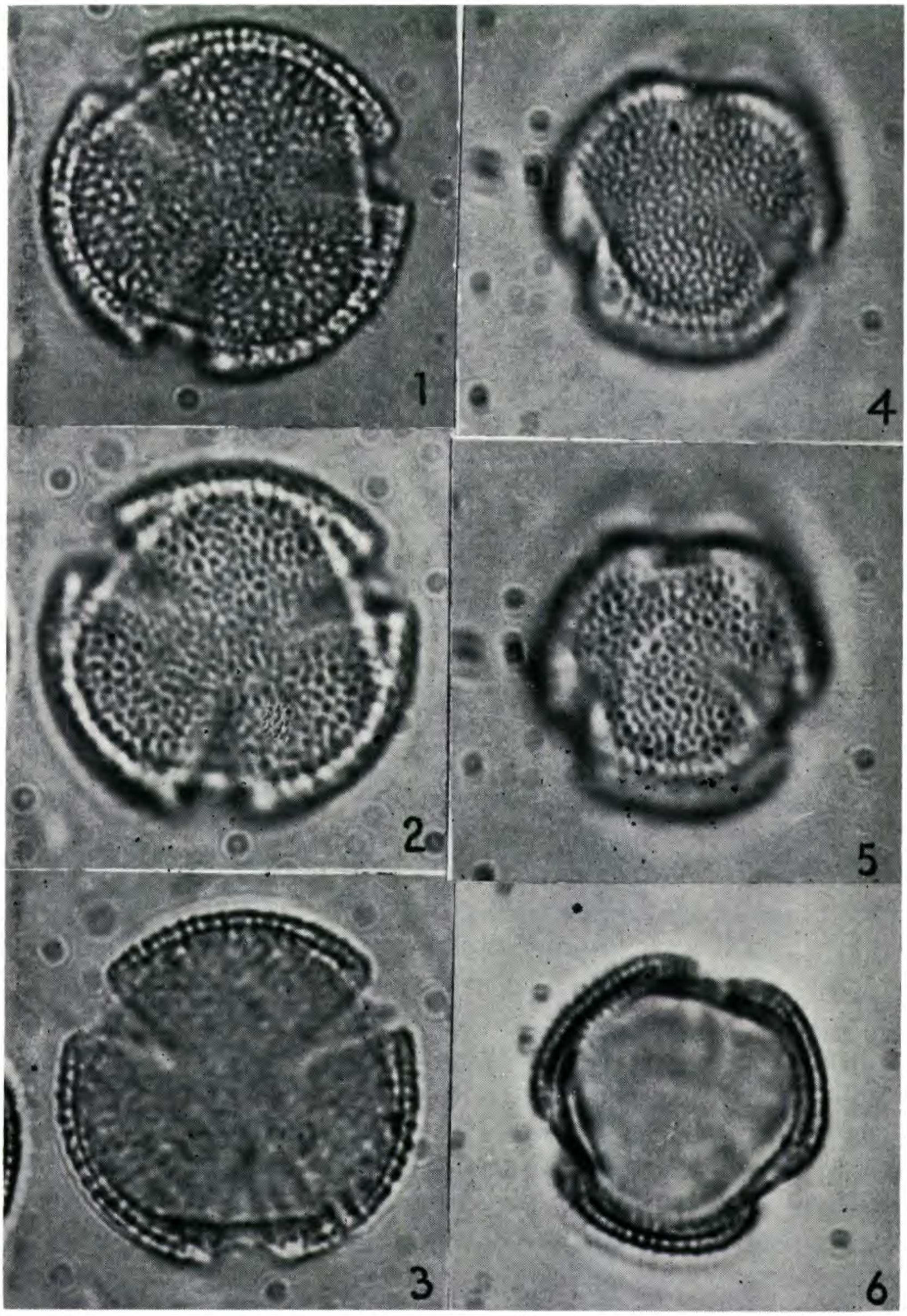

Plate 1294

Figs. 1-3 Thrum pollen of *Oldenlandia umbellata* L., in three different foci × 1250 approx.

Figs. 4-6 Pin pollen of *O. umbellata* L., × 1250 approx.

tance in revealing the phylogenetic and phytogeographical limitations of polymorphic species and also in tracing the history and evolution of tropical floras, (c.f. Baker, 1954, 1956), it is suggested that the heterostyled Rubiaceae as well as other heterostyled species in general should be investigated for pollen dimorphism.

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